

(iii) said substrate at least partially covered by a single layer, said layer comprising a polymeric fine fiber comprising a fiber with a diameter of about 0.01 to 0.5 microns such that after test exposure for a test period of 16 hours to test conditions of 140°F air and a relative humidity of 100% retains greater than 30% of the fiber unchanged for filtration purposes;

(b) a first end cap and a second end cap;

(i) said media pack being secured to said first end cap at said first end of said media pack;

(ii) said media pack being secured to said second end cap at said second end of said media pack;

(iii) at least one of said first and second end caps including a sealing portion; said sealing portion comprising a material compressible in a direction toward said media pack.

6. (AMENDED) The element of claim 5 wherein the polyvinylidene halide comprises polyvinylidene chloride.

9. (AMENDED) The element of claim 8 wherein the polyvinylalcohol is crosslinked with about 1 to 40 wt.% of a crosslinking agent.

14. (AMENDED) The element of claim 2 wherein the polymeric fiber comprises a condensation polymer, other than a copolymer formed from a cyclic lactam and a C<sub>6-10</sub> diamine monomer or a C<sub>6-10</sub> diacid monomer, and a resinous additive comprising an oligomer having a molecular weight of about 500 to 3000 and an aromatic character wherein the additive miscible in the condensation polymer but forms a hydrophobic coating on the fiber.

15. (AMENDED) The element of claim 2 wherein the polymeric fiber comprises a condensation polymer, other than a copolymer formed from a cyclic lactam and a C<sub>6-10</sub> diamine monomer or a C<sub>6-10</sub> diacid monomer, and a resinous additive comprising an oligomer having a molecular weight of about 500 to 3000 and an alkyl phenolic aromatic character wherein the additive miscible in the condensation polymer but forms a hydrophobic coating on the fiber.

16. (AMENDED) The element of claim 2 wherein the condensation polymer comprises a nylon polymer, and a resinous additive comprising an oligomer having a molecular weight of about 500 to 3000 and an aromatic character wherein the additive miscible in the condensation polymer but forms a hydrophobic coating on the fiber.

21. (AMENDED) The element of claim 16 wherein the nylon polymer is combined with a second nylon polymer, the second nylon polymer differing in molecular weight or monomer composition.

23. (AMENDED) The element of claim 21 wherein the second nylon polymer comprises a nylon copolymer.

48. (AMENDED) A filter element according to claim 1 wherein said seal is an axially directed seal.

49. (AMENDED) A filter element according to claim 1 wherein said seal is a radially directed seal.

50. (AMENDED) A filter element according to claim 1 further including:

- (a) an inner support liner extending between said first and second end caps;
- (i) said inner support liner being between said sealing portion and said media pack.

53. (AMENDED) A system including an engine rated at an engine intake air flow of at least 3 cfm and having an air cleaner constructed and arranged to filter the engine intake air; the air cleaner including a housing and a primary filter element operably positioned therein, the primary filter element comprising:

- (a) a media pack comprising a sheet-like substrate, said pack having a first end and an opposite second end;

(i) said substrate having a plurality of pleats having a length extending from said first end to said second end, the substrate comprising a filter medium having a high efficiency when tested with particles having a diameter of 0.01 to 1  $\mu$ ; and

(ii) said substrate at least partially covered by a single layer;

(A) said layer comprising a fine fiber having a diameter of about 0.01 to 0.5 microns such that after test exposure for a test period of 16 hours to test conditions of 140°F air and a relative humidity of 100% retains greater than 30% of the fiber unchanged for filtration purposes, said fiber comprising a polymer composition selected from the group consisting of:

(1) an addition polymer and about 2 to 25 wt% of an additive, the additive comprising a resinous material having a molecular weight of about 500 to 3000 and an aromatic character, the additive being miscible in the polymer but forms a hydrophobic coating on the fiber,

(2) a condensation polymer and about 2 to 25 wt% of an additive, the additive comprising a resinous material having a molecular weight of about 500 to 3000, and an aromatic character wherein the additive is miscible in the condensation polymer but forms a hydrophobic coating on the fiber, and

(3) mixtures thereof.

57. (AMENDED) The system of claim 53 wherein the condensation polymer comprises a nylon copolymer combined with a second nylon polymer, the second nylon polymer differing in molecular weight or monomer composition.

75. (AMENDED) A system according to claim 74 wherein:

(a) said pleated construction has a tubular shape and defines an open interior;

(b) said air cleaner housing includes an airflow tube; said primary filter element being operably mounted on said airflow tube;

(c) said primary filter element further includes:

(i) a first, open end cap and a second, opposite end cap;

(A) said media pack being bonded to said first end cap at said first end of said media pack;

(B) said media pack being bonded to said second end cap at said second end of said media pack;

(ii) an inner support liner extending between said first end cap and said second end cap;

(iii) said first end cap including a radially or axially directed sealing portion;

(A) said sealing portion being inwardly directed toward said open interior;

(B) said sealing portion comprising a polyurethane foam material compressed between and against said inner support liner and said airflow tube to form a first radial seal between said primary filter element and said air cleaner housing.

76. (AMENDED) A system according to claim 75 wherein:

(a) said primary filter element further includes an outer support liner extending between said first and second end caps;

(b) said second end cap defines a center aperture; and

(c) said second end cap includes a sealing portion;

(i) said sealing portion comprising a polyurethane foam material compressed between and against said outer support liner and said air cleaner to form a second radial seal between said primary filter element and said air cleaner housing.

81. (AMENDED) A system including a fluid compressor and having an air cleaner constructed and arranged to filter compressor intake air; the air cleaner including a housing and a primary filter element operably positioned therein, the primary filter element comprising:

(a) a media pack having a first end and an opposite second end;

(i) said media pack including a pleated construction of a media composite; said pleated construction including a plurality of pleats having a length extending from said first end to said second end, the substrate comprising a filter medium having a high efficiency when tested with particles having a diameter of 0.01 to 1  $\mu$ ; and

(ii) said media composite including a substrate at least partially covered by a single layer;

(A) said layer comprising a fine fiber having a diameter of about 0.01 to 0.5 microns such that after test exposure for a test period of 16 hours to test conditions of 140°F air and a relative humidity of 100% retains greater than 30% of the fiber unchanged for filtration purposes, said fiber comprising a polymeric composition selected from the group consisting of:

(1) an addition polymer and about 2 to 25 wt% of an additive, the additive comprising a resinous material having a molecular weight of about 500 to 3000 and an aromatic character, the additive being but forms a hydrophobic coating on the fiber miscible in the polymer,

(2) a condensation polymer and about 2 to 25 wt% of an additive, the additive comprising a resinous material having a molecular weight of about 500 to 3000, and an aromatic character wherein the additive is miscible in the condensation polymer but forms a hydrophobic coating on the fiber; and

(3) mixtures thereof.

85. (AMENDED) The system of claim 81 wherein the condensation polymer comprises a nylon copolymer combined with a second nylon polymer, the second nylon polymer differing in molecular weight or monomer composition.

104. (AMENDED) A system according to claim 103 wherein:

- (a) said pleated construction has a tubular shape and defines an open interior;
- (b) said air cleaner housing includes an airflow tube; said primary filter element being operably mounted on said airflow tube;
- (c) said primary filter element further includes:
  - (i) a first, open end cap and a second, opposite end cap;
    - (A) said media pack being bonded to said first end cap at said first end of said media pack;
    - (B) said media pack being bonded to said second end cap at said second end of said media pack;
  - (ii) an inner support liner extending between said first end cap and said second end cap;
    - (A) said sealing portion being inwardly directed toward said open interior;
    - (B) said sealing portion comprising a polyurethane foam material compressed between and against said inner support liner and said airflow tube to form a seal between said primary filter element and said air cleaner housing.

105. (AMENDED) A system according to claim 104 wherein:

- (a) said primary filter element further includes an outer support liner extending between said first and second end caps;
- (b) said second end cap defines a center aperture; and
- (c) said second end cap includes a sealing portion;
  - (i) said sealing portion comprising a polyurethane foam material compressed between and against said outer support liner and said air cleaner to form a second seal between said primary filter element and said air cleaner housing.

111. (AMENDED) A system including a vehicle powered by a gas turbine engine and having an air cleaner constructed and arranged to filter gas turbine intake air; the air cleaner comprising:

(a) a media pack having a first filter panel and a second filter panel;

(i) each of said first filter panel and second filter panel including a pleated construction of a media composite; said pleated construction, the substrate comprising a filter medium having a high efficiency when tested with particles having a diameter of 0.01 to 1  $\mu$  including a plurality of pleats;

(ii) said media composite including a substrate at least partially covered by a single layer;

(A) said layer comprising a fine fiber having a diameter of about 0.1 to 0.5 microns such that after test exposure for a test period of 16 hours to test conditions of 140°F air and a relative humidity of 100% retains greater than 30% of the fiber unchanged for filtration purposes, said fiber comprising a polymeric composition selected from the group consisting of:

(1) an addition polymer and about 2 to 25 wt% of an additive, the additive comprising a resinous material having a molecular weight of about 500 to 3000 and an aromatic character, the additive being miscible in the polymer but forms a hydrophobic coating on the fiber,

(2) a condensation polymer and about 2 to 25 wt% of an additive, the additive comprising a resinous material having a molecular weight of about 500 to 3000, and an aromatic character wherein the additive is miscible in the condensation polymer but forms a hydrophobic coating on the fiber; and

(3) mixtures thereof.

114. (AMENDED) The system of claim 111 wherein the condensation polymer comprises a nylon copolymer combined with a second nylon polymer, the second nylon polymer differing in molecular weight or monomer composition.

128. (AMENDED) A method for filtering air; the air having a temperature of at least 140°F, the method comprising:

(a) directing the air through a media composite

(i) the composite comprising a sheet-like substrate in a pleated construction, the substrate comprising a filter medium having a high efficiency when tested with particles having a diameter of 0.01 to 1  $\mu$ ; and

(ii) the substrate at least partially covered by a single layer, the layer comprising a fine fiber having a diameter of about 0.1 to 0.5 microns such that after test exposure for a test period of 16 hours to test conditions of 140°F air and a relative humidity of 100% retains greater than 30% of the fiber unchanged for filtration purposes, said fiber comprising a polymeric composition selected from the group consisting of:

(A) an addition polymer and about 2 to 25 wt% of an additive, the additive comprising a resinous material having a molecular weight of about 500 to 3000 and an aromatic character, the additive being miscible in the polymer but forms a hydrophobic coating on the fiber,

(B) a condensation polymer and about 2 to 25 wt% of an additive, the additive comprising a resinous material having a molecular weight of about 500 to 3000, and an aromatic character wherein the additive is miscible in the condensation polymer but forms a hydrophobic coating on the fiber: and

(C) mixtures thereof.



## 132. (AMENDED) A filter element comprising:

## (a) a media pack comprising:

(i) a construction of a media composite; said construction including substrate having a plurality of pleats having a length extending from said first end to said second end, the substrate comprising a filter medium having a high efficiency when tested with particles having a diameter of 0.01 to 1  $\mu$ ;

(ii) said construction having a tubular shape and defining an open interior having a first and a second opposite ends; and

(iii) said substrate at least partially covered by a single layer;

(A) said layer comprising a polymeric fine fiber having a diameter of about 0.01 to 0.5 microns such that after test exposure for a test period of 16 hours to test conditions of 140°F air and a relative humidity of 100% retains greater than 30% of the fiber unchanged for filtration purposes, said fiber comprising a condensation polymer and about 2 to 25 wt% of an additive, the additive comprising a resinous material having a molecular weight of about 500 to 3000, and an aromatic character wherein the additive is miscible in the condensation polymer but forms a hydrophobic coating on the fiber, said condensation polymer comprising a copolymer other than a copolymer formed from a cyclic lactam and a C<sub>6-10</sub> diamine monomer or a C<sub>6-10</sub> diacid monomer;

## (b) a first end cap and a second end cap;

(i) said media pack being secured to said first end cap at said first end of said media pack;

(ii) said media pack being secured to said second end cap at said second end of said media pack;

(iii) at least one of said first and second end caps including a sealing portion; said sealing portion comprising a material compressible in a direction toward said media pack.

140. (AMENDED) A filter element according to claim 132 wherein:

- (a) said first end cap is ring-shaped defining an open center and includes an inner surface facing the open center;
- (i) said sealing portion comprising said inner surface.

146. (AMENDED) A method for filtering vehicle cabin ventilation air, the vehicle having a temperature of at least 140°F during any period of operation, the method comprising:

- (a) directing the air through a media composite

(i) the composite comprising a substrate in a pleated construction, the substrate comprising a filter medium having a high efficiency when tested with particles having a diameter of 0.01 to 1  $\mu$ ; and

(ii) the substrate at least partially covered by a single layer, the layer comprising a fine fiber having a diameter of about 0.1 to 0.5 microns such that after test exposure for a test period of 16 hours to test conditions of 140°F air and a relative humidity of 100% retains greater than 30% of the fiber unchanged for filtration purposes, said fiber comprising a polymeric composition selected from the group consisting of:

(A) an addition polymer and about 2 to 25 wt% of an additive, the additive comprising a resinous material having a molecular weight of about 500 to 3000 and an aromatic character, the additive being miscible in the polymer but forms a hydrophobic coating on the fiber,

(B) a condensation polymer and about 2 to 25 wt% of an additive, the additive comprising a resinous material having a molecular weight of about 500 to 3000, and an aromatic character wherein the additive is miscible in the condensation polymer but forms a hydrophobic coating on the fiber; and

(C) mixtures thereof.